



# **Smart Power Infrastructure Demonstration for Energy Reliability and Security (SPIDERS)**

**Sponsors: DoD, DOE, DHS**

**Operational Managers: PACOM and NORTHCOM**

**Technical Manager: USACE/ERDC-CERL**

**Asst Technical Manager: Sandia National Labs**

**Transition Manager: NAVFAC**

**Asst Transition Manager : Pacific Northwest National Lab**

**Points of contact: Mr. Ross Roley, PACOM, [ross.roley.ctr@pacom.mil](mailto:ross.roley.ctr@pacom.mil)  
and Dr. Bill Waugaman, NORTHCOM, [william.waugaman@northcom.mil](mailto:william.waugaman@northcom.mil)**



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# USPACOM Overview

- Largest of 10 Combatant Commands, 15 time zones
- 1 of 6 Regional COCOMS (CENTCOM, SOUTHCOM, NORTHCOM, EUCOM, AFRICOM)
- 36 countries, 6 largest armed forces, 3 largest economies





# USNORTHCOM Overview



- **USNORTHCOM anticipates and conducts Homeland Defense and Civil Support operations within the assigned area of focus (AOF) to defend, protect, and secure the United States and its interests.**
- **AOF is the United States, Alaska, Canada, Mexico, Bahamas, Puerto Rico, and the U.S. Virgin Islands and the surrounding water out to approximately 500 nautical miles.**







# The Situation



Defense Science  
Board



**Feb 08 - “Critical national security and homeland defense missions are at an unacceptably high risk of extended outage from failure of the electric grid.”**

**May 09 - “Aurora threat revealed the possibility that sophisticated hackers could seriously damage the grid by destroying mechanisms downstream from the initial point of attack.”**



**Feb 10 - “DoD will conduct a coordinated energy assessment, prioritize critical assets, and promote investments in energy efficiency to ensure that critical installations are adequately prepared for prolonged outages caused by natural disasters, accidents, or attacks.”**

*References:*

- *The Defense Science Board Task Force on DoD Energy Security, “More Fight – Less Fuel,” February 2008.*
- *Powering America’s Defense, Energy and the Risks to National Security, by the Center for Naval Analyses Military Advisory Board, May 2009*
- *Quadrennial Defense Review Report, February 2010*



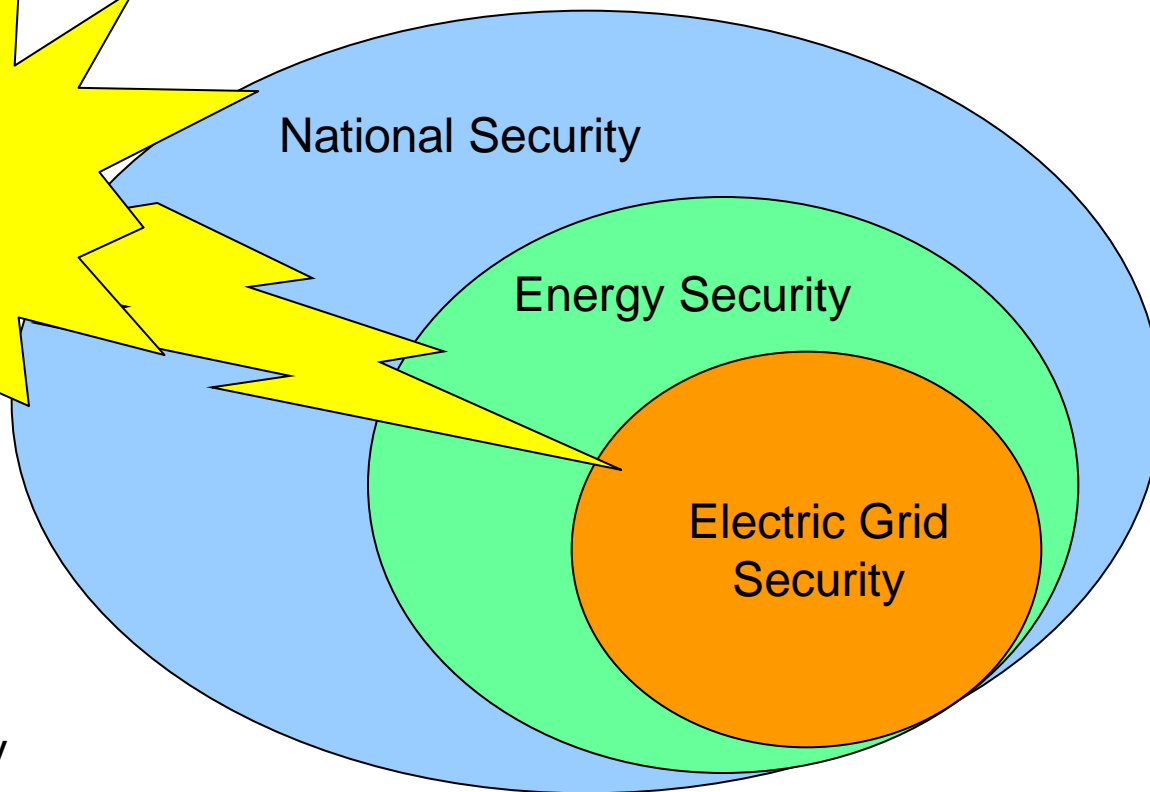


# The National Engine



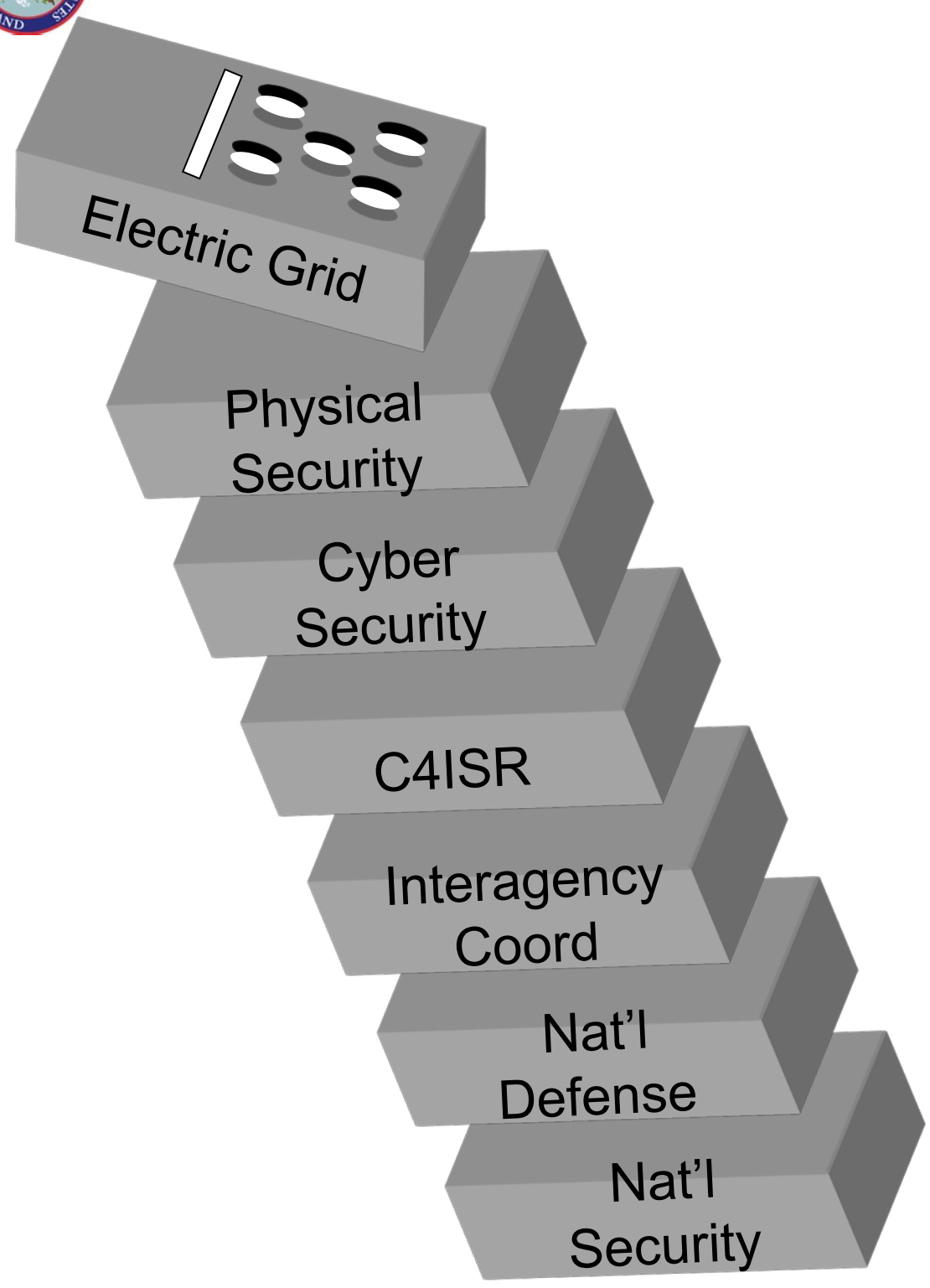
Electricity  
is our  
“national  
engine”

- Reliability
- Efficiency
- Security
- Resiliency





# Dependence on a Fragile Grid





# SPIDERS Summary



**The ability of today's warfighter to command, control, deploy, and sustain forces is adversely impacted by a fragile, aging, and fossil fuel dependent electricity grid, posing a significant threat to national security.**

## **The SPIDERS JCTD will address four critical deficiencies:**

- Inability to protect task critical assets from loss of power due to cyber attack
- Inability to integrate renewable and other distributed generation electricity to power task critical assets in times of emergency
- Inability to sustain critical operations during prolonged power outages
- Inability to manage installation electrical power and consumption efficiently, to reduce petroleum demand, carbon "footprint," and cost

**The modern military needs to evolve its power infrastructure. New threats demand new defenses**







# What is the SPIDERS JCTD?

***Reduce the “unacceptably high risk”\* of extended electric grid outages by developing the capability to “island” installations while maintaining operational surety & security***

- **Demonstrate:**

- Cyber-security of electric grid applying virtual secure enclave to SCADA
- Smart Grid Technologies & applications
- Secure micro-grid for sustained mission assurance and emergency support
- Integration of distributed & variable renewable generation and storage
- Demand-side management
- Redundant back-up power systems

- **Results in:**

- Assessment of VSE capability to SCADA networks
- First complete DoD installation with a secure, smart “islandable” micro-grid
- Template for DoD-wide installation & industry energy security

- **High Priority for Three Combatant Commands**

*\*From Defense Science Board Task Force on DoD Energy Security, Feb 2008*





# SPIDERS Participants



- **USPACOM, USNORTHCOM  
DOE, and DHS**
- **5 DOE Nat'l Labs**
- **USACE/ERDC-CERL**
- **Military Services**
- **Naval Facilities Engineering  
Command**
- **Local Utility Companies**
- **States of Hawaii & Colorado**



**US Army Corps of Engineers**  
Engineer Research and Development Center  
Construction Engineering Research Laboratory



Hawaiian Electric Company

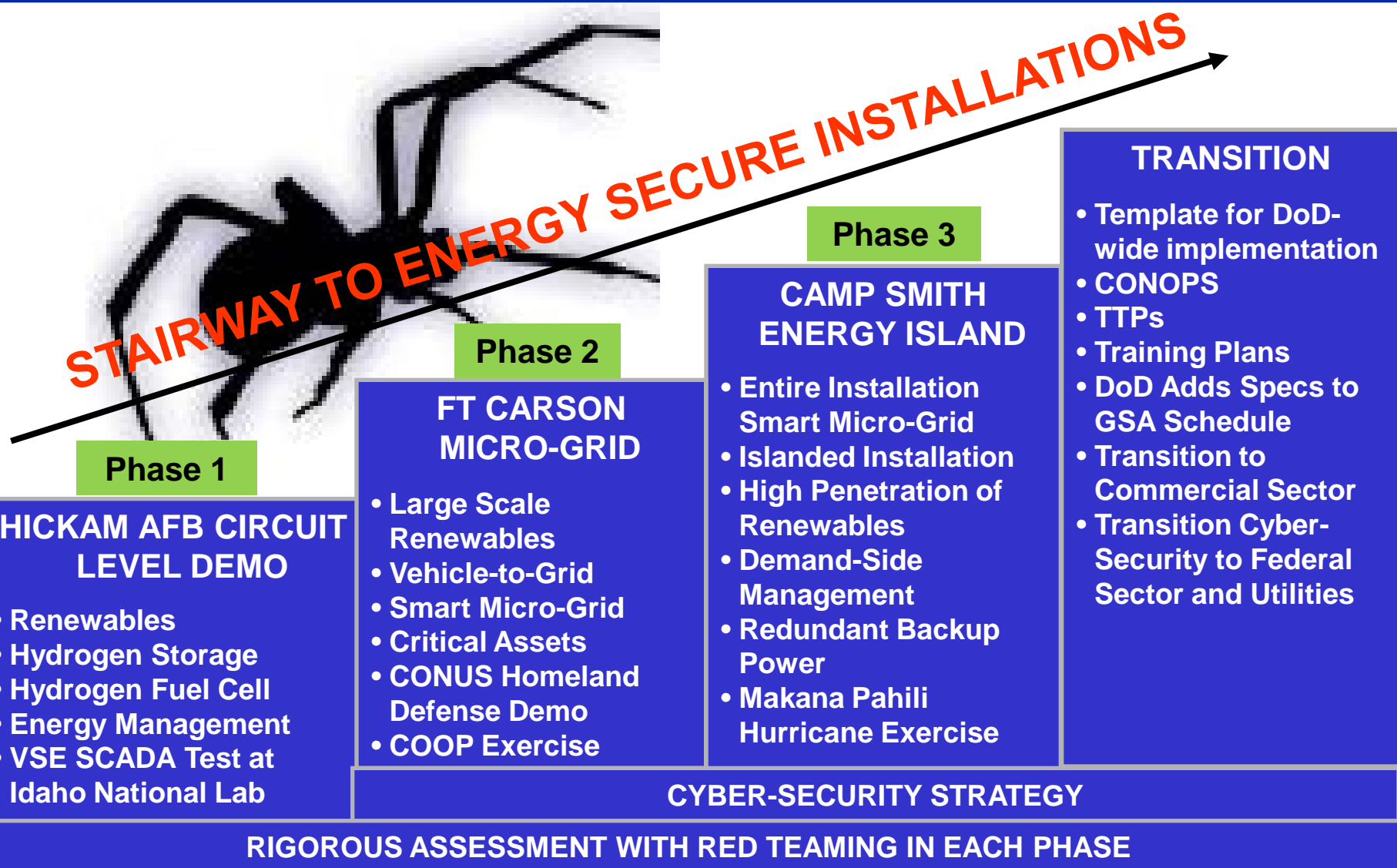


Colorado Springs Utilities  
*It's how we're all connected*





# Expected SPIDERS Outcome





# Current Design Status



- Preliminary Design for Joint Base Pearl Harbor Hickam
- Waste Water Treatment Plant is critical load
  - Proxy for mission critical load (size and complexity)
  - Leverages existing hydrogen and RE infrastructure
  - Critical loads / uninterruptible
  - Critical loads / interruptible
- Conceptual Designs to be completed this year
  - Ft Carson, CO – larger micro grid and electric V2G
  - Camp Smith, HI – entire installation

**Design process is a crawl, walk, run progression.**





# Cyber Experimentation



- Defense in depth of Industrial Control Systems
  - Virtual Secure Enclave
  - National SCADA test bed
- Utilize both DoD and DOE red teaming
- Final exam: Operational Utility Assessment

**Leverage military installations as infrastructure test bed.**







# Transition Strategy



- **Template for DoD-wide implementation**
- **Concept of Operations for installations**
- **Training Plans**
- **DoD Specifications added to GSA Schedule**
- **Transition to Commercial Sector**
- **Transition Cyber-Security to Federal Sector and Utilities**





# QUESTIONS?



SMART POWER INFRASTRUCTURE DEMONSTRATION FOR ENERGY RELIABILITY AND SECURITY